MASTER PLAN
FOR BROOKDALE CEMETERY
Dedham, Massachusetts

Volume I

Prepared for:

Town of Dedham
Department of Public Works

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Prepared by:

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ENGINEERS·LANDSCAPE ARCHITECTS·PLANNERS·SURVEYORS

MASTER PLAN
FOR
BROOKDALE CEMETERY
DEDHAM, MASSACHUSETTS

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PREFACE

This report represents the culmination of investigations and reports by Vollmer Associates, LLP, and its sub-consultants. The intent of this report is to clearly and concisely unite the findings and recommendations of the various component reports into a single stand-alone document. In combining the various specialty reports, Vollmer modified some of the text in sub-consultant reports for the purposes of brevity, clarity, and consistency. Additionally, Vollmer adjusted sub-consultant cost estimates to account for contingencies and engineering, legal and administrative costs. Sub-consultant reports are included in a separate Appendix (Vollmer II) to this report, for cross-reference and more in-depth discussion of the findings represented in this report.

ACKNOWLEDGEMENTS

Vollmer Associates, LLP would like to express our appreciation to the many Town Officials and Departments who assisted us in the preparation of this report. Particularly Paul G. Keane, P.E., DPW Commissioner; John Roscoe Maloney, Cemetery Superintendent; Max R. Kamel, Assistant Town Engineer; and Michael K. Williams, J.D., DPW GIS Administrator.

We also want to thank the following Cemetery Advisory Committee members: Joseph Findlen, Nicholas Civitarses, George Doherty, John Whitney, John MacDonald and the late Al Olsen.

Additionally, we want to acknowledge our subconsultants, ENSR, Dyer Brown & Associates, Inc., Richard D. Kimball Company, Inc., and GEI Consultants, for their contributions to this report.

EXECUTIVE SUMMARY

This "Master Plan for Brookdale Cemetery," prepared by Vollmer Associates LLP (Vollmer), presents an assessment of the conditions and needs of Brookdale Cemetery, and recommendations and a plan for implementing improvements over the next 20 years. Our assessment revealed the following conditions and needs:

- The Ebenezer T. Paul Fountain is presently inoperable and in need of restoration.
- There are some environmental compliance and health and safety issues that need to be resolved.
- At the present burial rate, the cemetery is likely to reach full capacity within the next five (5) years.
- Additional gravesites need to be developed to continue to comply with Massachusetts General Laws, Chapter 119.
- To optimize the limited space available for additional gravesites, the cemetery layout needs to be recongfigured.
- The Office/Maintenance Building is in poor condition, is plagued by water leakage, requires numerous improvements, and should be replaced.
- The water distribution system needs to be replaced.
- The roadways need to be improved.
- Drainage improvements are necessary to alleviate ponding that occurs in the area of Lily Path Extension and Poplar Avenue Rear during rainfall events.
- A Columbrium should be installed.

To fulfill the cemetery's needs, Vollmer recommends that the Town implement the following improvements[1].

- Restore the function of the Ebenezer T. Paul Fountain, line the pond to retain water, and install a water recirculation/skimmer system.
  Estimated Cost: **$180,000**

[1] All estimated costs presented under this paragraph include a 25% contingency and 25% for engineering, legal and administrative costs.

- Implement a program to resolve environmental compliance and health and safety issue as outlined in Table 2-4 herein.
  Estimated Cost: **$27,400**

- Realign the northern perimeter roadway and construct a cul-de-sec to provide space for development of additional gravesites. Resurface roadways.
  Estimated Cost: **$760,000**

- Install 4,400 double depth lawn crypts.
  Estimated Cost: **$3,990,000**

- Commission an Architectural Study to define the architectural style, footprint and functional layout of a new Office/Maintenance Building.
  Estimated Cost: **$10,000**

- Based on the findings of the Architectural Study, construct a new Office/Maintenance Building.
  Estimated Cost: **$470,000**

- Construct a looped water distribution with new spigots and isolation valves.
  Estimated Cost: **$1,860,000**

- Create a Columbarium with 960 Cremation Niches.
  Estimated Cost: **$470,000**

- Develop a set of guidelines for future landscape improvements in corrobation with the Cemetery Advisory Committee.
  Estimated Cost: **$10,000**

- Make landscape improvements.
  Estimated Cost: **$40,000**

The total estimated cost of implementing the above recommendations is approximately $8.237 million. When implemented, the recommendations will resolve current environmental, health and safety issues, facilitate cemetery operations, bring the cemetery into compliance with Massachusetts General Laws, and provide gravesites well into the next twenty (20) years. Resolving environmental compliance and health and safety issue should be the first priority, followed by construction of improvements. Vollmer suggests that construction improvements be implemented in phases, in the sequence presented on the following page.

SUGGESTED SEQUENCE OF CONSTRUCTION

PHASE	DESCRIPTION OF WORK	CONSTRUCTION COST[2]
1	Restore function of existing fountain, including lining the pond and installing a water recirculation/skimmer system. Install new water lines and spigots along Brookdale Avenue, O'Brien Path, and Ash Avenue[3].	***$400,000***
2	Install 170 double depth lawn crypts at Veteran's Section.	***$160,000***
3	Construct a new cul-de-sac near Lily Path Extension. Install new water lines and spigots on Lily Path Extension and Maple Avenue[3].	***$400,000***
4	Install 879 double depth lawn crypts west of the Lily Path Extension.	***$780,000***
5	Realign Poplar Avenue Rear and Cyndonia Avenue Rear and install new water lines[4].	***$780,000***
6	Install 660 double depth lawn crypts south of the realigned Cyndonia Path Rear.	***$640,000***
7	Install 1,100 double depth lawn crypts southwest of Cyndonia Path Rear.	***$1,010,000***
8	Install new water lines and spigots along Cedar and Evergreen Avenues[3].	***$640,000***
9	Install new water lines and spigots along Lily Path, Brookdale Avenue, & Spruce Path[3].	***$420,000***
10	Construct a new Office/Maintenance Building, parking area, and main cemetery entrance[5].	***$760,000***
11	Close the existing cemetery entrance on Brookdale Avenue. Demolish the existing Office/Maintenance Building.	***$280,000***
12	Install 755 double depth lawn crypts east of Catalpa Avenue.	***$670,000***
13	Install 265 double depth lawn crypts by the former cemetery entrance.	***$240,000***
14	Construct first Columbarium freestanding wall unit.	***$220,000***
15	Install 595 remaining double depth lawn crypts at Veteran's Section.	***$540,000***
16	Install additional Columbarium freestanding wall units	***$250,000***
	Total Probable Cost	***$8,190,000***

[2] All costs include 25% contingency and 25% for engineering, legal and administrative costs.
[3] In conjunction with water line installation, the roadway will be improved (refer to Minor Cemetery Roadways Detail on Figure 7).
[4] Refer to Cemetery Circulation Roadways Detail on Figure 7.
[5] Prior to construction, commission an Architectural Study to define building architecture, footprint and functional layout.

1.0 INTRODUCTION

1.1 PURPOSE

The Town of Dedham retained Vollmer Associates, LLP to assess the condition and needs of the Brookdale Cemetery for the foreseeable future. In conjunction with subconsultants ENSR, Dyer/Brown & Associates Inc., and R.D. Kimball Company, Inc., Vollmer assessed the architectural, structural, mechanical, plumbing, electrical, environmental, health, and safety conditions at the Office/Maintenance Building. A limited asbestos survey was also conducted. This report presents the findings of the assessment and recommendations and costs for implementing capital improvements that will facilitate cemetery operations, help the Town comply with building, health and safety, and environmental codes and regulations, and allow the Town to provide gravesites for the next twenty (20) years in compliance with the laws of the Commonwealth of Massachusetts.

2.0 EXISTING CONDITIONS

2.1 BACKGROUND

Brookdale Cemetery, established in 1878, is situated on approximately 46.8 acres of land. It contains an Office/Maintenance Building, a Fountain, eight (8) Memorials, and approximately 900 unsold gravesites (See Figure 1 – Existing Conditions Plan).

The cemetery grounds are operated and maintained by the Dedham Department of Public Works (DPW). Five (5) DPW staff, located at the Office/Maintenance Building, tend to the daily cemetery operations, i.e. grounds maintenance, preparation of grave sites, and lot sales.

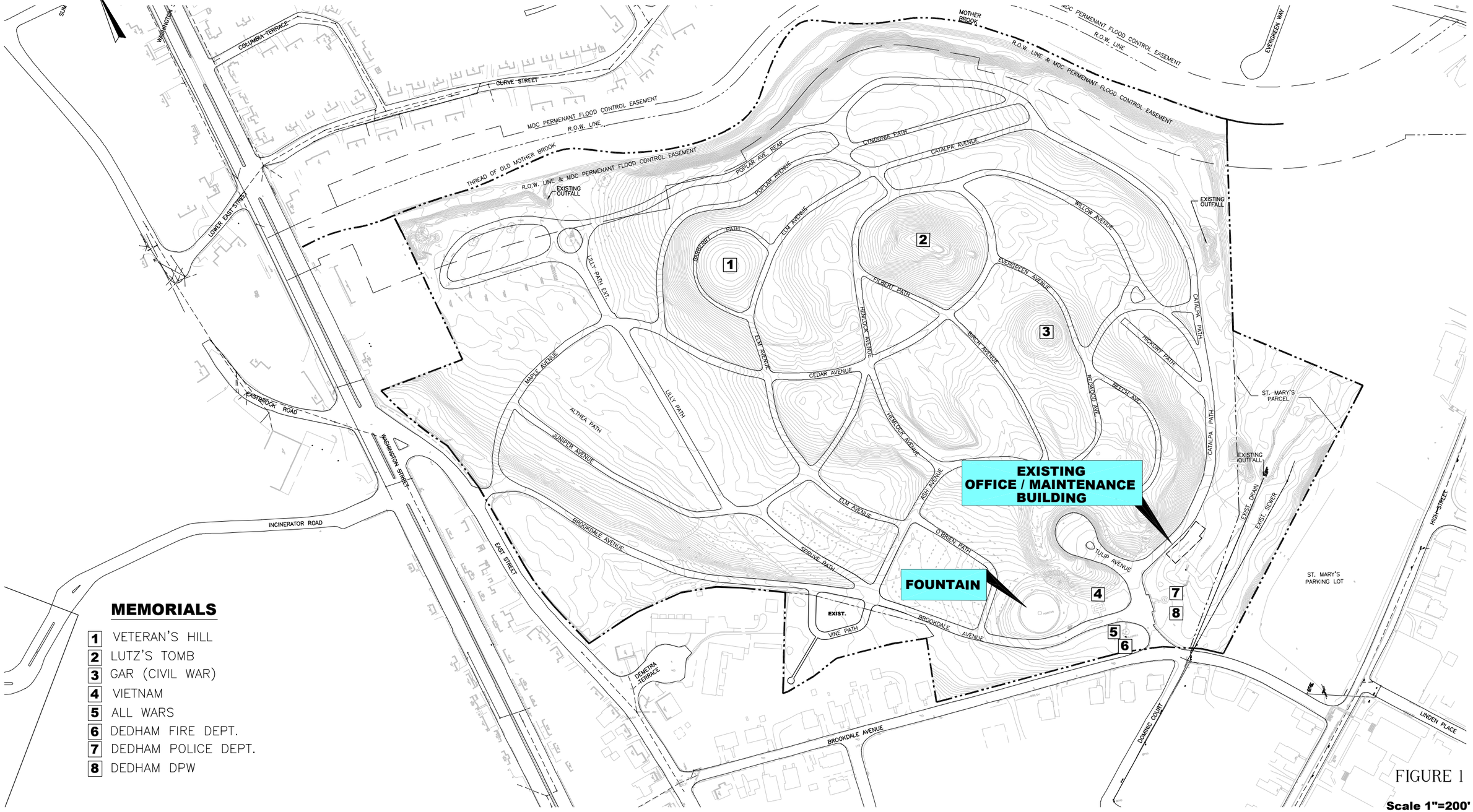
2.2 OFFICE/MAINTENANCE BUILDING

2.2.1 GENERAL

The Office/Maintenance Building is a relatively small structure with office and garage areas of approximately 1,000 square feet and 1,500 square feet, respectively. The original building is approximately 60 years old, is constructed of concrete masonry block, and has a low pitched wood roof structure. A two bay wood frame garage was subsequently added to the building. Figure 2 on Page 3 depicts the office (front) area of the building as viewed from the northwest. This is a focal point for visitors seeking direction to gravesites. Figure 3 depicts the garage (rear) area of the building as viewed from the southeast. The garage is used for maintenance and storage of DPW vehicles (3 trucks and 1 backhoe) and equipment (mowers, etc.).

Brookdale Cemetery

Existing Conditions Plan



MEMORIALS

1. VETERAN'S HILL
2. LUTZ'S TOMB
3. GAR (CIVIL WAR)
4. VIETNAM
5. ALL WARS
6. DEDHAM FIRE DEPT.
7. DEDHAM POLICE DEPT.
8. DEDHAM DPW

FIGURE 1

Scale 1"=200'

FIGURE 2 – VIEW OF OFFICE AREA

FIGURE 3 – VIEW OF GARAGE AREA

In concert with its sub-consultants, Vollmer performed an assessment of the architectural, structural, mechanical and electrical, environmental health and safety conditions of the Office/Maintenance Building. The results are summarized in Table 2-1 below and on Table 2-2 on the page following. More detailed information is contained in the Appendices to this report.

TABLE 2-1

OFFICE/MAINTENANCE BUILDING
SUMMARY OF STRUCTURAL/ARCHITECTURAL ASSESSMENT

Structural Assessments:

- The building is in poor condition.
- Substandard insulation was used throughout the building.
- Poor exterior grading has lead to water damage throughout the building.
- During rainstorms, water infiltrates the building through the threshold of a side egress adjacent to the driveway and the building.
- Settlement has occurred in the portion of the building between the wood framed garage and the original cement masonry block structure, causing severe cracking in the rear wall. Also, roof joists in this section have been damaged, most likely by the vehicles stored in this garage area.
- The wood framed garage portion of the building is in very poor condition.
  - Clapboards are rotting in many places.
  - Walls are noticeably leaning outward.
  - Some of the roof framing has slipped off the top plate support in the walls. In an apparent attempt to mitigate this problem, some of the framing has been retrofitted with an extension boards to maintain bearing support.
- The garage portion of the building may be in danger of collapse if subjected to extreme snow load conditions. The condition of the leaning walls also indicates it could be subject to severe damage from peak wind loads.

Architectural Assessment:

- The building lacks exit signs and emergency lights.
- Garage space is inadequate for maneuvering and maintenance of vehicles.
- The original garage framing is below grade and allows stormwater run-off to enter the building below the sill. This condtion has caused the sill to rot and mold and mildew to accumulate throughout the building
- A raised platform has been constructed in the office area in an attempt to minimize water damage.
- Roof framing is sagging and is split at the hip connections.
- The building lacks interior year-round mechanical ventilation
- Windows and doors are not energy efficient. The garage doors are badly deteriorated.
- The bathrooms are not handicap accessible.
- Exterior building walls need to be insulated.

TABLE 2-2

OFFICE/MAINTENANCE BUILDING
SUMMARY OF HVAC/PLUMBING/ELECTRICAL/ENVIRONMENTAL ASSESSMENT

HVAC Assessments:

- A gas-fired hot-air furnace in the utility room, which provides heat to the office areas, is in excess of 20 years old and nearing the end of its useful service life.
- A second combustion air louver is needed in the utility room.
- Bathrooms lack exhaust fans.
- The gas-fired unit heater located in the garage is between 15 and 20 years old and is nearing the end of its useful service life.

Plumbing Assessments:

- Hot water piping from the electric water heater is not insulated.
- Plumbing fixtures in the bathrooms are not handicapped accessible.
- The building lacks a fire suppression system.

Electrical

- Work areas lack general use grounded type receptacles.
- No withstanding recent ugrades to accommodate the computer system, the existing service panel does not have the capacity for additional circuits such as additional general use receptacles.
- Buildings lighting systems have poor illumination levels and lack energy efficient fixtures.
- Exterior building lighting fixtures do not have lamps.

Environmental

- Gasoline, diesel fuel, oil, and transmission fluid containers were observed in the storage room and garage. Staining was observed on concrete floors in the garage and storage room.

2.2.2 ARCHITECTURAL/STRUCTURAL

As evideinced by the summary assesment in Table 2-1, the building is generally in poor condition and in need of major improvements. The building, situated at the base of a hill, is plagued by water leaking onto the floor during severe rain events. The slab on grade floor further exacerbates the problem, allowing water to flow through the building. A raised platform has been constructed within the office area to minimize the water damage. Water leakage has caused the formation of mold and mildew throughout the building. According to cemetery personnel, a French drain was installed on the exterior in an attempt to mitigate the leakage, apparently without success.

Several roof trusses have been damaged in one of the garage stalls and are being supported by temporary wood framing (see Figure 4 below).

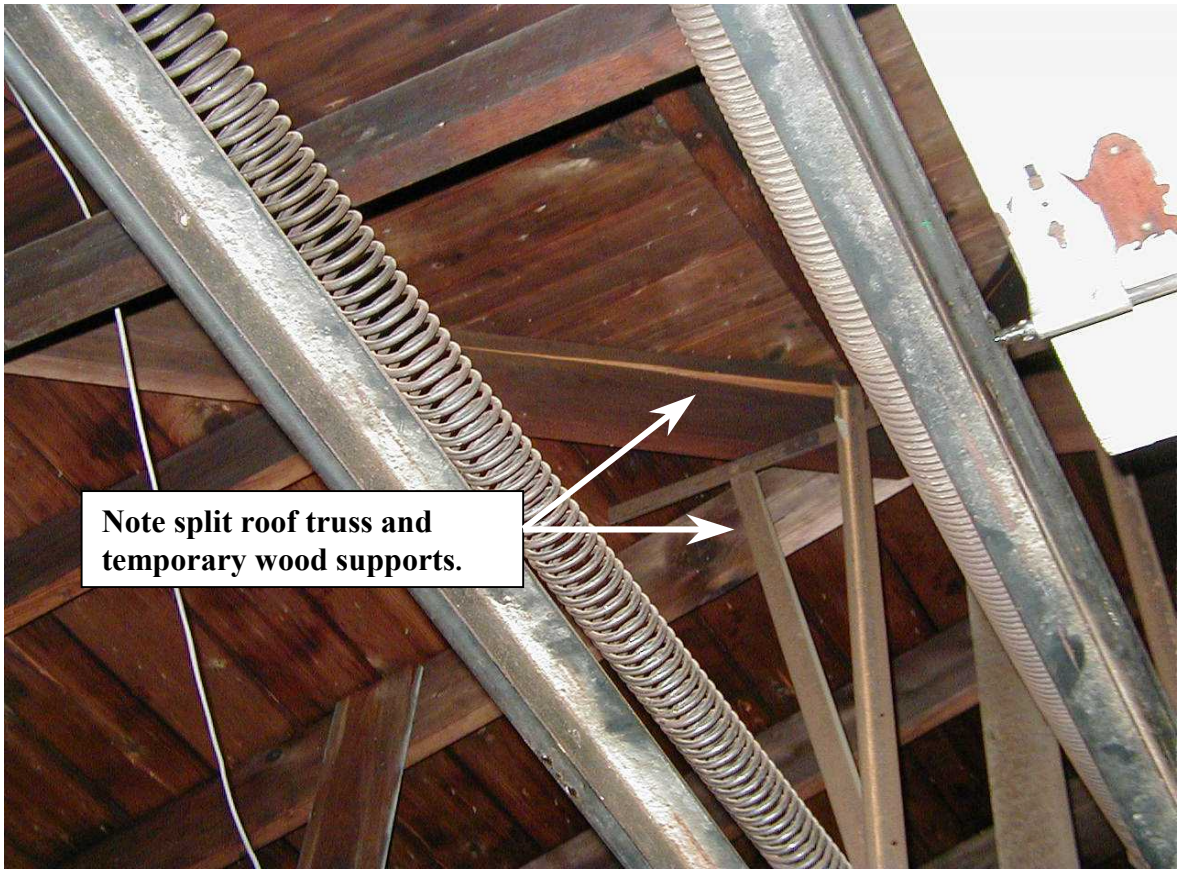


FIGURE 4 – DAMAGED ROOF TRUSS

2.2.3 PLUMBING/MECHANICAL/HVAC

The building is served by public utilities including water (Dedham/Westwood Water District), gas (Keyspan), sewer (Town of Dedham, MWRA), telephone (Verizon), and electric (NSTAR). Water is supplied to the building through a 1-inch water service that serves two bathrooms and a wall hydrant. A 30-gallon electric water heater provides hot water.

A 2-inch gas service provides gas to both a gas-fired hot-air furnace for heating the office work areas and a gas-fired unit heater for heating the garage. Both the furnace and unit heater are nearing the end of their useful service life and need to be replaced.

The building plumbing discharges by gravity to the Town's sanitary sewer system. It is not known whether the floor drains in the two bathrooms discharge to drywells or to the sanitary sewer. This needs to be confirmed through smoke and/or dye testing. Additionally, the bathrooms are poorly ventilated and require the installation of exhaust fans.

Based on information provided by the Department of Public Works, the Town typically spends $200 annually for HVAC system repairs.

2.2.4 ELECTRICAL

Telephone and electric services are provided to the building via overhead wires from utility pole #18-3 located on Brookdale Avenue. The electric service is 120/240 volt, single phase, and connects to a 100 ampere panelboard load center. The panelboard needs to be replaced to accommodate additional circuits that are needed for convenience receptacles and lighting fixtures. In addition, non-grounding electrical outlets need to be upgraded to grounding type. Emergency lighting and illuminated exit signs and a fire alarm panel are also needed. Based on information provided by the Department of Public Works, the Town typically spends $200 annually for electrical system repairs. In 2001, the Town spent $1,200 on electrical system modifications to accommodate computers.

2.2.5 ENVIRONMENTAL

Lead paint tests were not performed as part of the assessment but should be performed prior to any rehabilition of painted surfaces on the building to determine whether lead is present. If the tests indicate the prescence of lead, a lead abatement may be needed to properly handle and dispose of the lead.

Flourescent lighting ballasts were not accessible to allow an inspection to determine the prescence of PCB's. Although there was no visable sign of leakage, since the lights were installed when the building was constructed, it is possible that the ballasts might contain PCB's. So, the ballasts should be replaced and properly disposed.

2.2.6 NEEDED IMPROVEMENTS

It is obvious from the preceding assessment that the Office/Maintenance Building needs extensive improvements. A summary of the needed improvements and an estimate of the probable cost of implementing them is presented in Table 2-3 on the following page.

Upon further assessment of the condition of the building and the estimated cost of required improvements, Vollmer believes that the Town's money would be better spent constructing a new building. Though more costly ($310,000, excluding contingencies, engineering, legal and administration costs), a new building offers the following benefits:

- Development of 680 gravesites in the area currently occupied by site of the existing Office/Maintenance Building which would generate about $1,810,000 in revenue; based on January 2002 dollars.
- Avoid displacement of cemetery staff during construction;
- Provide a more archtiectural pleasing and functional building;

TABLE 2-3*

OFFICE/MAINTENANCE BUILDING
NEEDED IMPROVEMENTS AND ESTIMATES OF PROBABLE COST

Architectural /Structural Improvements:		
• Add insulation and concrete skim coat to exterior of building.		$30,000
• Replace windows and doors.		$10,000
• Replace existing garage doors.		$15,000
• Construct swale and/or drainage system to capture run-off from hill and roadway north of the Office/Maintenance Building		$25,000
• Seal crack and replace or reinforce broken joists		$ 5,000
• Replace entire wood framed garage.		$30,000
• Construct handicap accessible bathrooms.		$25,000
	Subtotal	**$140,000**
Mechanical/HVAC Improvements:		
• Replace gas-fired hot-air furnace		$3,500
• Install a ducted air return to the furnace.		$1,000
• Modify combustion air louver and duct to gas fired heating unit.		$1,200
• Install exhaust fans for bathrooms.		$1,000
• Replace gas-fire unit heater w/controls and flue.		$2,000
	Subtotal	**$8,700**
Plumbing Improvements:		
• Install electric water cooler.		$1,800
• Provide insulation for piping.		$1,500
• Replace fixtures.		$7,500
	Subtotal	**$10,800**
Electrical Improvements:		
• Install new service entrance panelboard with additional spares		$1,000
• Install energy efficient lighting fixtures.		$1,000
• Install illuminated exit signs and emergency lighting		$500
• Add new grounding type convenience outlets.		$500
• Install new local fire alarm panel with initiating devices.		$2,500
• Install exterior lighting fixtures		$500
	Subtotal	**$6,000**
Environmental Improvements		
• Test walls for lead paint		$800
• Replace and dispose of light ballasts containing PCB's		$1,000
	Subtotal	**$1,800**
	TOTAL	**$167,300**

* Excludes contingencies, engineering, legal and adminstrative costs.

Therefore, we suggest that the Town have a new Office/Maintenance Building constructed. Our recommendations for a new Office/Maintenance Building are discussed in greater detail in Section 3.0 of this report.

2.3 SITE UTILITIES

2.3.1 POTABLE WATER

The cemetery site has a water distribution system that supplies water to the fountain, the Office/ Maintenance Building, and to spigots located throughout the cemetery. The spigots provide water to irragate flowers, plants, lawn areas, and other landscape features. The distribution system is approximately 25 years old and consists of a network of 2-inch diameter plastic pipe and 1-inch diameter stanchions at the spigots. The system is connected to the Dedham/Westwood Water District System at four (4) location: two at Brookdale Avenue near the main cemetery entrance, one at Brookdale Avenue near the fountain, and one at East Street near Maple Avenue. Flow into the cemetery is metered at each location.

The water distribution system requires frequent maintenance to repair broken pipes and spigots. Vandalism and freezing pipes are common causes of broken spigots and water lines, respectively. Based on information provided by the Department of Public Works, the Town typically spends about $600 annually to repair the system and $2,500 for water. In the past, the cost of water consumption has been significantly higher due to water lost as a result of pipe breaks. These costs do not include emergency repairs performed by the cemetery staff.

In the event of a system break within the cemetery, the Town can shut down the system by closing isolation valves. However, in the time required to do this, a significant amount of water can be lost. To mitigate this, Vollmer suggests that a system of automated control valves be installed. The valves would automatically close upon sensing a drop in system pressure, which typically occurs when there is a break in the distribuiton system.

2.3.2 DRAINAGE

Site drainage is primarily storm water run-off that is collected in storm drains. There are two drainage systems, the northern system and the southern system. The northern drainage system collects run-off where Poplar Avenue Rear intersects Lily Path Extension. This system needs to be modified to capture surface run-off that currently ponds on Lily Path Extension due to improper drainage, grading, and an insufficient number of catch basins. This drainage system discharges directly to the Mother Brook. The southern drainage system collects run-off from the Brookdale Avenue area and discharges to the northeast portion of the parcel recently acquired by the Town from St. Mary's Church.

2.3.3 SANITARY SEWERAGE

A 24-inch by 36-inch brick sewer is located just south of the Office/Maintenance Building (See Figure 1). Wastewater from the Office/Maintenance Building discharges to this sewer. The sewer is approximately 100 years old and flows from Brookdale Avenue towards Maverick Street. The condition of this sewer was not assessed as part of this plan.

2.4 EXISTING ENVIRONMENTAL, HEALTH, AND SAFETY SITE CONDITIONS

Vollmer investigated the environmental, health, and safety conditions at the site. The investigations included a site inspections, historical research, municipal research, state research, and databases search including Massachusetts Geographic Information Systems (MassGIS), National Priority List (NPL), Comprehensive Environmental Response, Compensation, and Liability Information System (CERLIS), Resource Conservation and Recovery Information System (RCRIS), Emergency Response Notification System (ERNS), Site Transition List (SHWS), Solid Waste FacilityDatabase/Transfer Stations (LF), and the Summary Listing of all the Tanks Registered in the State of Massachusetts (UST). The available/gathered information was then reviewed based on applicable state and federal regulations. The results of our data base research in presented in Table 2-4 on the following page. Table 2-5 on Page 12 presents the results of our enviromental compliance and health and safety investigations, which are are discussed below.

From our observations, it is clear that there are a variety of environmental compliance and health and safety issues that the Town needs resolve. These include the following:

Environmental Compliance Issues

- Provide Environmental Response Procedures training to all employees
- Post Emergency Response Numbers at telephones.
- File a Very Small Quantity Generator (VSQG) status permit with the Department of Environmental Protection.
- Provide Hazardous Waste Management training (proper labeling and handling of hazardous waste) to all employees.
- Post MSDS and train one employee to properly display and allow access to the MSDS.
- Store flamable and combustible materials in OSHA approved cabinets.
- Properly dispose lighting fixture ballasts that contain PCB's
- Test paint for lead prior to any renovation projects.
- Perform smoke or dye tests to determine the discharge location of the Office/Maintenance Building floor drains. Floor drains not connected to the sanitary sewer are recommended to be connected or plugged.
- File a Notice of Intent with the conservation commission prior to any construction or filling of land within the 100-year flood boundary of Mother Brook.

TABLE 2-4

RESULTS OF ENVIROMENTAL DATA BASE REARCH

DESCRIPTION	OBSERVATIONS
Conservation/Recreation:	
Areas of Critical Environmental Concern	Not observed within or adjacent to project site
Protected and Recreational Open Space	Not on project site
Scenic Landscapes	Not on project site
State Register of Historic Places	Not on project site
Landmarks	Not on project site
Natural Heritage & Endangered Species Program (NHEPS) Priority Habitats	Not on project site
NHEPS Estimated Habitats of Rare Wildlife	Not on project site
NHEPS Certified Vernal Pools	Not on project site
NHEPS Potential Vernal Pools	Not on project site
Regulated Areas:	
DEP Solid Waste Facilities	Not on project site
Underground Storage Tank Locations	Not on project site
DEP Wellhead Protection Areas	Not on project site
Surface Water Protection Areas	Not on project site
DEP Chapter 21 Sites	Not on project site
Outstanding Resource Waters	Not on project site
Groundwater Discharge Points	Not on project site
FEMA Q3 Flood	100 year flood is on project site

Health and Safety Issues

- Develop a formal Hazard Communications Policy including MSDS, list of chemical inventories, labeling of hazardous waste, etc.
- Respiratory protection is not routinely used and enforced. A respiratory protection and monitoring plan should be implemented.
- Although no violations of state and federal regulations were observed relative to the hazard assessment and personal protection equipment (PPE), a hazard assessment should be conducted for operations that may present a hazard to employees, to ensure employees are outfitted with the proper PPE.
- DPW provides hearing protection to employees but does not have a hearing conservation program. A program should be developed to monitor noise levels and train personnel in the proper use of hearing protection.
- A grinding/buffing machine in the garage does not have a proper guard and should be fitted with one.

TABLE 2-5

RESULTS OF ENVIROMENTAL COMPLIANCE AND HEALTH AND SAFETY INVESTIGATIONS

ENVIRONMENTAL COMPLIANCE ISSUES	
Air Quality	Operations do not require permitting
Environmental Response Procedures	Training is required
Emergency Response Numbers	Posting of Numbers was not observed
Hazardous Waste Handling	Site has not been identified as a hazardous waste generator, but maintenance of vehicles occurs on site.
Labeling of Hazardous Waste	Labeling was generally adequate
Material Safety Data Sheets (MSDS)	Chemical inventory lists are not maintained
Spill Prevention Control and Countermeasure Plans (SPCC)	Does not store oil or oil products which exceed the storage threshold criteria for SPCC
Groundwater/Soil Contamination	No records were observed that indicate past or present threats
Storage of Flamable Materials	Six full five gallon gasoline cans were observed
Fire Extinguishers	No obstructions to fire extinguishers were observed
PCB Use and Management	Possibility of PCB's in light ballasts exist, but none were observed with sign of leakage
Lead Paint	Possibility of lead paint exists, but sampling was not performed
Indirect discharges/floor drains	Three floor drains observed in building, discharge location have not been confirmed
HEALTH AND SAFETY ISSUES	
Hazard Communication Program	A formal program does not exist
Personal Protective Equipment Hazard Assessment	Several operations were observed that appeared to be a hazard to employees (woodworking, use of various chemicals, lawn mowing, tree trimming, heavy equipment operation, etc.)
Respistory Protection/Exsposure Monitoring	Respitory protection is not routinely used and is not required by the Town
Hearing Conservation	Hearing protectors are provided by Town, but a formal program is not in place.
Electrical Safety	Temporary wiring was not observed, but non-grounding type receptacles are being used in the work areas.
Machine Guarding	One grinding/buffing machine was observed without guards

- A grinding/buffing machine in the garage does not have a proper guard and should be fitted with one.

Table 2-6 presents a summary of the costs of resolving the aforementioned environmental compliance and health and safety issues.

TABLE 2-6
COST SUMMARY
ENVIRONMENTAL, HEALTH, AND SAFETY

	ENVIRONMENTAL COMPLIANCE SUMMARY		**COST**
1	Emergency Response and Notification		$1,000
2	Emergency Response Information	(included in Emergency Response and Notification)	$0
3	Hazardous Waste Generator Status	(included in MSDS Reporting)	$0
4	Hazardous Waste Management		$1,000
5	Labeling of Hazardous Waste	(included in Hazardous Waste Management)	$0
6	MSDS Reporting Requirements		$3,500
7	*Storage of Flammable Materials*		*$4,000*
8	PCB Management	(included in Table 2-2)	
9	Lead Paint Testing	(included in Table 2-2)	
10	Indirect Discharges/Floor Drains		$1,400
		Subtotal	$10,900
	GENERAL HEALTH AND SAFETY		
9	Hazard Communication		$3,500
10	Personal Protective Equipment/Haz. Assessment		$5,000
11	Respiratory Protection/Exposure Monitoring		$2,500
12	Hearing Conservation		$1,000
14	Machine Guarding		*$1,000*
		Subtotal	$13,000
		Contingencies	$3,500
		Total	**$27,400**

Shaded and Italics items indicate violations.

2.5 LANDSCAPE FEATURES

The overall character of the Cemetery's landscape is one of rolling hills and winding pathways. The two entrances are marked with attractive granite posts and iron gates. Large memorials occupy the most prominent hilltops. The existing vegetation consists of lawn, with a variety of evergreen and deciduous trees and shrubs. The older sections of the cemetery exhibit more significant tree cover, as the trees are mature and densely planted. The central portion of the cemetery appears to contain many of the older gravesites, while

the outer ring road (Catalpa Path) and the northeastern corner of the cemetery appear newer. The Vine Path section on the westside of the cemetery was developed in recent years and is primarily distinguished by open lawn.

The cemetery has been expanded on numerous occasions, resulting in a variety of sometimes conflicting landscape design treatments. While many of the later landscaping improvements complement the older sections of the cemetery, some do not. In particular, the Office/Maintenance Building style, the hillside walls, and the landscaping adjacent to the monuments near the front entrance and in the cul-de-sac at the main gate, contrast sharply with the overall style of the cemetery.

A fountain is located to the west of the main entrance. (see Figure 5 below). On the hillside behind the fountain, the name "Brookdale" is spelled out with yew hedges. There is also There is also a Christian cross and some low stone walls at the base of the hill. The fountain was a gift to the Town erected in memory of Ebenezer T. Paul by his wife Marietta Paul. The fountainis not currently operating because of a pinched water supply line. The line was pinched by the weight of the fountain, which fell on it when the soil beneath the fountain and the fountain shifted. The pond in which the fountain is located has an earth bottom that is difficult to clean and maintain. The pond is cloudy due to

FIGURE 5 – EXISTING EBENEZER T. PAUL FOUNTAIN

organics, algae, and other particulates suspended in the water. The cloudy water draws attention away from the aesthetic aspects of the fountain.

2.6 GRAVESITES

To comply with Massachusetts General Law, Chapter 119, the Town needs to provide gravesites to its residents. At the current burial rate of approximately 200 per year, the Cemetery is likely to reach full capacity within the next five (5) years. To optimize the limited space available for graves, the Town recently began installing double depth lawn crypt in which two burials are stacked one on top of the other. To satisfy the demand for gravesites beyond the next five years, additional space will have to be created. This may be accomplished by reconfiguring the cemetery layout. Recommendations for reconfiguring the cemetery are discussed in Section 3.0.

3.0 RECOMMENDED IMPROVEMENTS

This section discusses Vollmer's recommendations for improving Brookdale Cemetery to facilitate operations over the next 10 to 20 years. The recommended improvements are based on the results of our investigation and assessment of the current operating conditions at the cemetery. Briefly, they include: a new Office/Maintenance Building, reconfigurating the roadways, a new potable water distribution system, storm drains and catch basins, landscaping, restorating the Ebenezer T. Paul Fountain, additional gravesites, and a columbarium for cremains.

3.1 OFFICE/MAINTENANCE BUILDING

As discussed in Section 2.2.6, rather than improve the existing Office/Maintenance Building, the Town's money would be better spent to construct a new building. Vollmer recommends that a new Office/Maintenance Building be built near the cemetery entrance, as shown on Figure 6 on the page following. This site makes use of the land purchased from St. Mary's Church and would be convenient to arriving visitors. Locating the building here and reconfiguring the Cemetery entrance road will create space for approximately 530 double depth lawn crypts (Area "E" and Area "F" on Figure 6). The space occupied by the existing building would accommodate another 150 double depth lawn crypts. The new building should have an architectural style that complements the aesthetic qualities of the cemetery. In this regard, Vollmer recommends that an Architectural Study be performed to define the architectural style, footprint, and functional layout for the new building. The estimated cost of an architectural study is about $10,000.

For budget purposes, the probable cost of constructing a new Office/Maintenance Building is estimated to be approximately $470,000, including engineering, legal and administrative fees.

Brookdale Cemetery

Recommended Improvements

POTENTIAL LOT EXPANSION AREAS

AREA	# OF CRYPTS
A	870
B	660
C	1,100
D	340
E	415
F	265
G	170
H	595
	4,415

MEMORIALS

1. VETERAN'S HILL
2. LUTZ'S TOMB
3. GAR (CIVIL WAR)
4. VIETNAM
5. ALL WARS
6. DEDHAM FIRE DEPT.
7. DEDHAM POLICE DEPT.
8. DEDHAM DPW

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- W PROP. WATER LINE
- D PROP. DRAIN LINE
- PROP. WATER SPIGOT

FIGURE 6

Scale 1"=200'

3.2 ROADWAYS

To create more gravesites, Vollmer recommends realigning Catalpa Path, Poplar Avenue Rear, and Cyndonia Path Rear along the northwestern side of the site, paralleling Mother Brook (see Figure 6). A new cul-de-sac will replace the existing circle in the northwest corner of the cemetery. This alignment will create space for 2,680 double depth lawn crypts (Areas "A", "B" and "C" on Figure 6). Part of the roadway will be within the Massachusetts District Commission (MDC) right-of-way and easement. Vollmer will interface with the MDC and the Dedham Conservation Commission during design to obtain all necessary permits and approvals.

Additionally, a "hierarchy of roadways" (defined by the width of the road) is recommended to assist visitors going to and from gravesites. The heirarchy of roadways consists of "Cemetery Circulation Roadways" and "Minor Cemetery Roadways" (see Figure 7on the following page). Circulation Roadways, which will be twenty (24) feet wide, are primarily ring or perimeter roads, i.e., Catalpa Path, Poplar Avenue Rear, Cyndonia Path, Brookdale Avenue, Maple Path Extension, and Maple Avenue. Minor Roadways are primarily roadways that cross through the inner part of the cemetery. Minor Roadways will be sixteen (16) feet wide.

3.3 SITE UTILITIES

3.3.1 POTABLE WATER

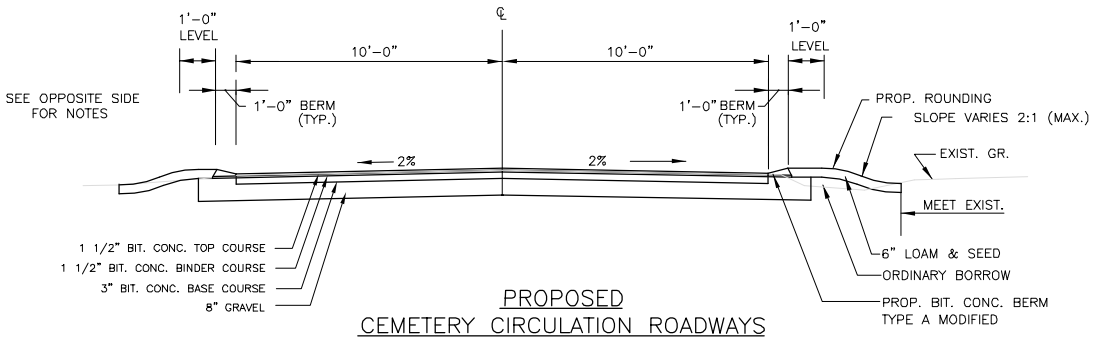
Vollmer recommends the complete replacement of the existing potable water distribution system with a looped system. The system would be replaced in phases over 10 to 20 years in conjunction with roadway improvements —the phasing of improvements is discussed in Section 4.0. The looped system will consist of 6-inch diameter ductile iron pipe (DIP), fittings and valves and will be connected to the Dedham/Westwood Water District System at two (2) locations near Brookdale Avenue and East Street. The actual locations will be determined during design after consultation with the Dedham/Westwood Water District. Piping extending from the 6-inch looped system will consist of 4-inch diameter DIP with 2-inch diameter polyethylene tubing at the water spigots (see Figure 7). The system will include automated valves, placed at strategic locations, that will automatically close when system pressure drops to a predetermined level in the event of a line break

Vollmer investigated the possibility of installing a new water supply well in the vicinity of the northernmost corner of the cemetery near Mother Brook. To determine the capacity of the well, test borings (see Appendix F for boring logs) were drilled and monitoring wells were installed. A pump test was performed to determine the well capacity and drawdown. The test indicated that sufficient water exists to supply the system, but that the drawdown influencing Mother Brook by withdrawing water directly from the brook.

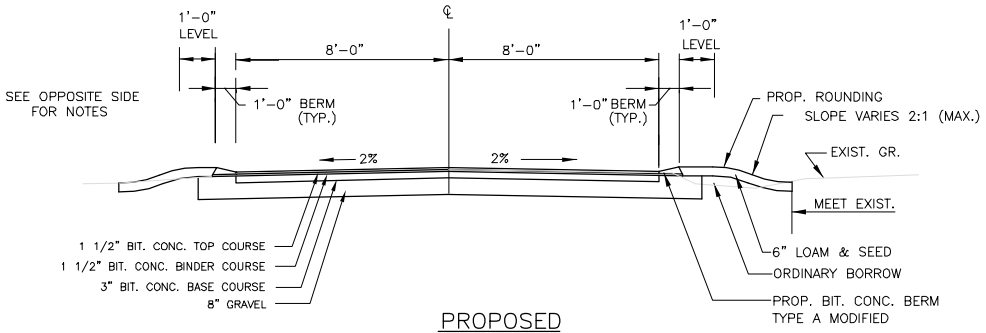
Water samples were taken from the monitoring wells and analyzed in a laboratory. The laboratory results (see Appendix G) indicate that the well water does not meet drinking

Brookdale Cemetery

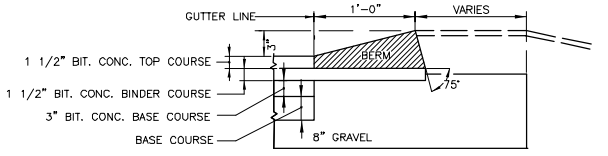
Construction Details



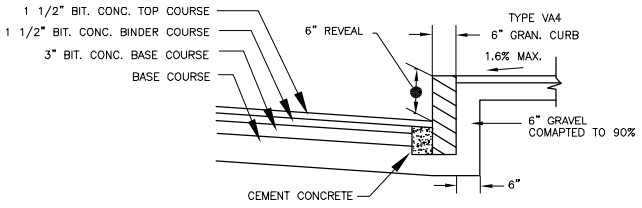
PROPOSED
CEMETERY CIRCULATION ROADWAYS
N.T.S.



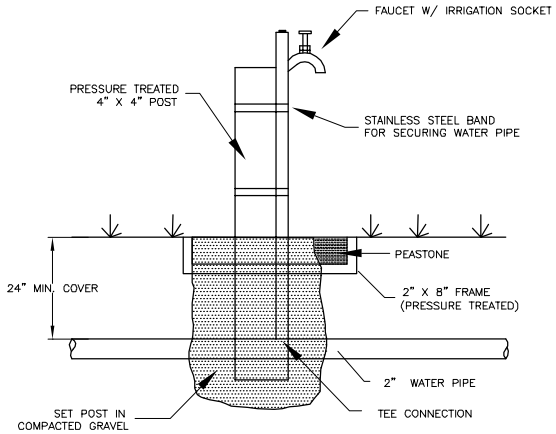
PROPOSED
MINOR CEMETERY ROADWAYS
N.T.S.



BITUMINOUS CONCRETE BERM TYPE A MODIFIED
N.T.S.



METHOD OF SETTING GRANITE CURB
N.T.S.



WATER SPIGOT DETAIL
N.T.S.

BROOKDALE CEMTERY
MASTER PLAN
TOWN OF DEDHAM

VOLLMER ASSOCIATES LLP
ENGINEERS • LANDSCAPE ARCHITECTS • PLANNERS

FIGURE 7
DATE: OCTOBER 2001

water quality standards. Thus, it would be necessary to treat the well water. Because of the influence on Mother Brook and the need to treat the well water, Vollmer believes it is not feasible to develop a well on site. Therefore, we recommend that the cemetery continue using the current water supply.

3.3.2 DRAINAGE

Recommended drainage improvements include installation of catch basins and storm drains near Tulip Avenue and Brookdale Avenue and Lily Path Extension and Poplar Avenue Rear cul-de-sac (see Figure 6). The drainage improvements at Brookdale Avenue include a connection to drain the pond to facilitate cleaning and maintenance. Drainage improvements at Lilly Path Extension will alleviate the ponding conditions that currently exist there.

Additionally, use of Best Management Practices (BMP's) may be necessary to gain approval from regulatory authorities and to comply with the Environmental Protection Agencies Phase II Storm Water Rule. BMP's might include a maintenance plan, particle separators, or infiltrators to improve the quality of storm water discharges to Mother Brook. The extent of BMP's, if any, will be determined during the drainage system design and permitting stage.

Vollmer also proposes improvements to the existing drainage system on Lily Path Extension. The improvements will provide additional catch basins and proper grading to help capture the run-off currently collecting on the Lilly Path Extension as a result of the existing grading.

3.3.3 SANITARY SEWERAGE

A sanitary sewer connection will be required for the Office/Maintenance Building. The connection will be made to the existing 24-inch by 36-inch brick sewer. The brick sewer is located in Dominic Court and extends along the southeast corner of the cemetery near the proposed Office/Maintenance Building.

3.4 LANDSCAPING

Vollmer recommends, during the next design phase, that a landscape architectural study be preformed to establish guidelines for future landscape improvements throughout the cemetery. The guidelines will be developed with the approval of the Cemetery Advisory Committee and will include components such as:

- A historical review to determine how the cemetery has been developed over the past 120 years.
- A "style" for the cemetery based on the original and key landscape element such as the stone fountain, the stone and iron gates, and the monuments located throughout the cemetery. The style will include elements such as, hierarchy of landscape treatments along Cemetery Circulation Roadways and Minor Cemetery Roadways, signage as a

means of wayfinding, and trees and planting details including types and general locations of the specified trees and plantings
- Evaluation of existing landscape features to address competing elements like the landscaped hill, the cul-de-sac, the Office/Maintenance Building, and the perimeter fence along Brookdale Avenue.

The cost of the Landscape Architectural Study is estimated to be about $10,000.

3.4.3 FOUNTAIN

The Ebenezer T. Paul Fountain and the landscaped backdrop are the focal point of the cemetery. As such, Vollmer recommends that the fountain be restored to working condition, and that the pond be lined to retain water. This will involve a new foundation support for the fountain, a new fountainhead, a Gunite liner with low profile, architecturally aesthetic sidewalls, a new water line, a new drain, and a water recirculation/skimmer system, as shown in Figure 8.

Gunite is a cementatious material that can be formed to create desired shapes and contours. It is more durable and easier to maintain than other liner materials such as Polyvinyl Chloride (PVC) and Polyethylene. Figure 8 shows a conceptual design for a Gunite pond liner.

The water recirculation/skimmer system will maintain a clean pond surface, and will consist of several precast concrete skimmer boxes with submersible pumps and piping, as detailed on Figure 8). The drain will be utilized to empty the pond for maintenance purposes and to release/replenish water.

Final details and configuration of the pond and recirculation/skimmer system will be worked out during the design phase in corroboration with the Town and the Cemetery Advisory Committee, to customize the design and enhance the natural surroundings.

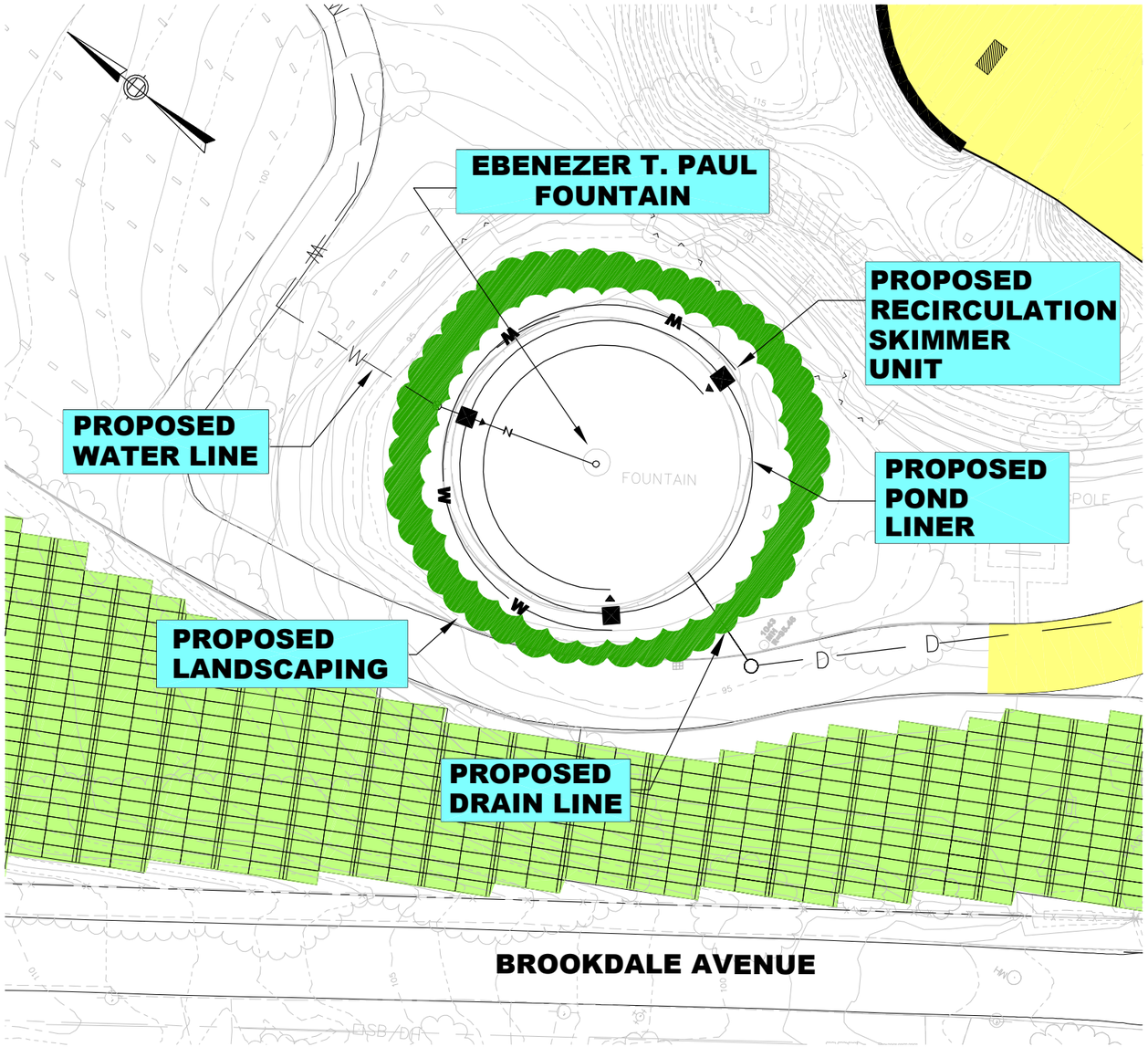
3.5 CEMETERY EXPANSION

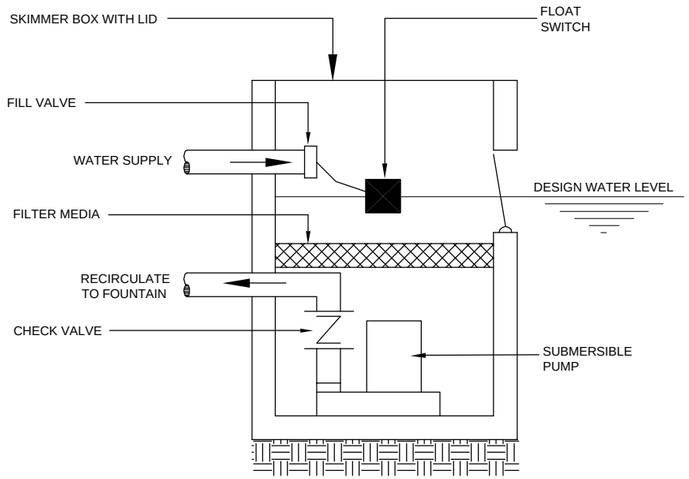
3.5.1 GENERAL

Vollmer examined the cemetery grounds to determine to what extent the property could be utilized for additional gravesites. We determined that the only land where additional gravesites can be developed are the area along the north and east perimeter of the cemetery, the area adjacent to the existing Office/Maintenance Building, and the area along Brookdale Avenue. To optimize the use of this land, Vollmer recommends realigning Catalpa Path, Cyndonia Path, and Poplar Avenue, demolishing of the existing Office/Maintenance Building, and reconfiguring the cemetery entrance. This will create area for the development of approximately 4,415 double depth crypts (see Areas “A” through “H” on Figure 6).

Brookdale Cemetery

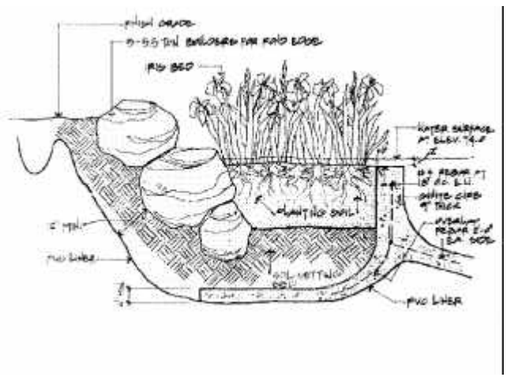
Fountain Plan and Details





TYPICAL RECIRCULTAION SKIMMER UNIT

N.T.S.



CONCEPTUAL GUNITE LINER DETAIL

N.T.S.

FIGURE 8

Scale 1"= 40'

3.5.2 COLUMBARIUM

The Cemetery currently uses urn vaults for storing cremains. In lieu of urn vaults, Vollmer recommends utilizing a Columbarium. The word "columbarium" is derived from the Latin word "columba", meaning, "dove", the symbol of spirit and peace. A Columbarium is a freestanding memorial with niches for the storage of cremains. Figure 9 illustrates a typical cremation niche. Cremains are sealed in an aluminum liner inserted in the niche. A decorative faceplate and brass nameplate are secured with tamper resistant fasteners to the niche. The are a number of decorative faceplate styles niche configurations that may be selected at the discretion of the Town and the Cemetery Advisory Committee.

Vollmer recommends that 960 cremation niches be installed in the future. A possible site for the Columbaria for these niches is the cul-de-sac at the end of Tulip Avenue. Figure 11 on the page following shows the location of three (3) Columbarium, each containing 320 niches (160 on each side).. Rectangular shaped Columbaria are shown, but other shapes (round, hexagonal and octagonal) and sizes are available. The Columbarium would measure about 6-feet high by 10-feet long by 5-feet wide. This type of Columbarium is called a Wall Unit (see Figure 10). The Columbarium is typically made of granite and/or marble.

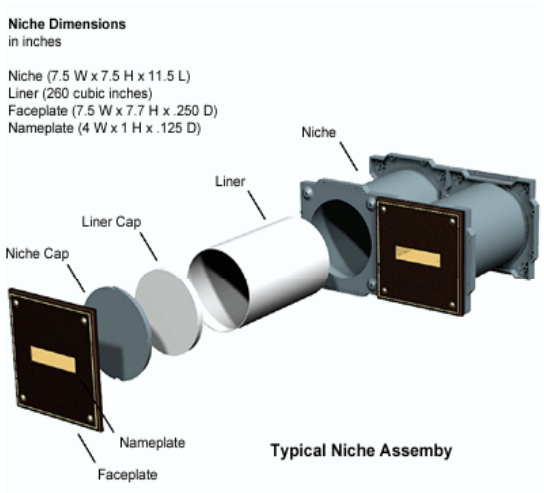


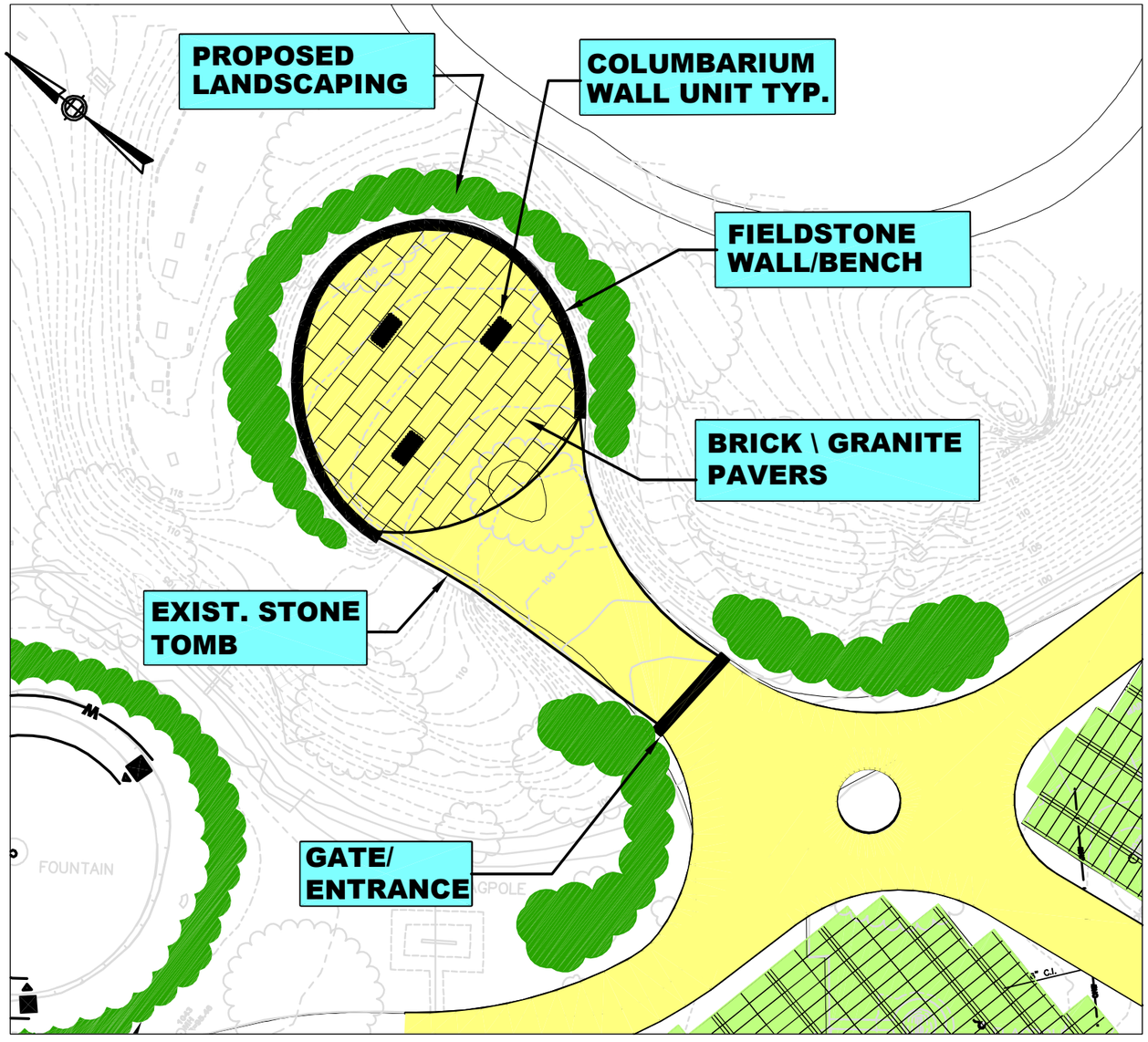
FIGURE 9 – TYPICAL CREMATION NICHE

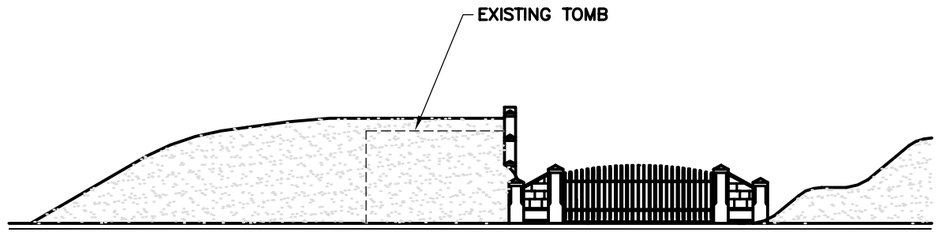
FIGURE 10 – TYPICAL FREESTANDING COLUMBARIUM WALL UNIT

Conceptually, we envision a memorial garden setting for the Columbaria with fieldstone benches, brick and granite pavers, and landscaping, with a decorative iron entrance gate, and incorporating the existing tomb, as shown in Figure 11. The details and configuration will be worked out during the design stage in corroboration with the Town and the Cemetery Advisory Committee.

Brookdale Cemetery

Columbarium Plan





CONCEPTUAL VIEW LOOKING FROM CEMETERY ENTRANCE TOWARDS COLUMBARIUM

FIGURE 11

Scale 1"= 40'

The existing tomb has an attractive pink granite block façade (see Figure 12) that has become weathered and tarnished. Vollmer recommends that the granite blocks be cleaned and that loose mortar joints be re-pointed. If Town and the Cemetery Advisory Committee desire not to incorporate the tomb into the memorial garden then it should be removed and the granite blocks salvaged.

FIGURE 12 – EXISTING TOMB FACADE

4.0 CONSTRUCTION

4.1 SEQUENCE

Vollmer has developed a sequence of construction for implementing the recommended improvements. Construction will be phased as shown in Figure 13 to minimizes to apportion the improvements budget over the next 10 to 20 years. The various phases of construction are color coded on Figure 13. The sequence of construction begins with the restoration of the existing fountain and ultimate ends with construction of the new cemetery main entrance.

The Town may substitute some phases of construction for others if the need arises, but should first evaluate changes to the sequence to determine the effect on future stages and impact on the efficiency of construction operations.

Brookdale Cemetery

Construction Phasing Plan

PHASE 6

PHASE 5

PHASE 7

PHASE 3

PHASE 4

PHASE 8

PHASE 9

PHASE 12

EXISTING MAINTENANCE BUILDING

PHASE 10

PROPOSED COLUMBARIUM

PHASE 14 & 16

PROPOSED OFFICE/ MAINTENANCE BUILDING

FOUNTAIN

PHASE 13

ENTRANCE

PHASE 1

PHASE 2

PHASE 15

PHASE 11

WASHINGTON STREET
COLUMBIA TERRACE
LILAC LANE
OAK STREET
CURVE STREET
MDC PERMENANT FLOOD CONTROL EASEMENT
R.O.W. LINE
MOTHER BROOK
R.O.W. LINE & MDC PERMENANT FLOOD CONTROL EASEMENT
RELOCATED CYDONIA PATH REAR
CYDONIA PATH
CATALPA AVENUE
POPLAR AVE. REAR
POPLAR AVENUE
WILLOW AVENUE
EVERGREEN WAY
CURVE STREET
LOWER EAST STREET
EXISTING OUTFALL
LILY PATH EXT.
BARBERRY PATH
ELM AVENUE
EVERGREEN AVENUE
FILBERT PATH
HEMLOCK AVENUE
BIRCH AVENUE
ELM AVENUE
CEDAR AVENUE
REDWOOD AVE.
BEECH AVE.
HICKORY PATH
CATALPA PATH
ST. MARY'S PARCEL
EASTBROOK ROAD
WASHINGTON STREET
MAPLE AVENUE
LILY PATH
JUNIPER AVENUE
HEMLOCK AVENUE
ASH AVENUE
ELM AVENUE
O'BRIEN PATH
LAUREL PATH
TULIP AVENUE
EXISTING OUTFALL
ST. MARY'S PARKING LOT
INCINERATOR ROAD
EAST STREET
BROOKDALE AVENUE
VINE PATH
EXIST. W
VETERAN'S SECTION
DEMETRA TERRACE
BROOKDALE AVENUE
DOMINIC COURT
UNDEN PLACE
HIGH STREET

CONSTRUCTION PHASES

- PHASE 1
- PHASE 2
- PHASE 3
- PHASE 4
- PHASE 5
- PHASE 6
- PHASE 7
- PHASE 8
- PHASE 9
- PHASE 10
- PHASE 11
- PHASE 12
- PHASE 13
- PHASE 14 & 15
- PHASE 16

FIGURE 13

Scale 1"=100'

Phase 1

Phase 1 of construction begins with the rehabilitation of the existing fountain adjacent to Brookdale Avenue. The rehabilitation includes a gunite and PVC liner, a re-circulation/skimmer system, a portion of the drain system, and foundation for the fountain. *(Note: construction of the drain system will not be complete until phase 11).* Landscaping improvements (to be developed during the design phase) will also be made around the immediate fountain area. The installation of water lines and spigots on Brookdale Avenue, O'Brien Path, and Ash Avenue will be included in this phase. A temporary 6-inch diameter water line connection to the existing water line in Brookdale Avenue will be necessary until future phases of the water supply system are complete. Details of this connection will be developed in the design phase. The roadways will be resurfaced in two stages, i.e. a temporary trench patch and a permanent overlay. The temporary patch will stay in-place for about one year to allow the trench backfill material to consolidate. The permanent surface will be a full width overlay wearing coarse. This resurfacing process will be typical for all water line installation on existing roadways.

Phase 2

Phase 2 includes the installation of 170 double depth lawn crypts at the Veteran's section to the left of the main entrance. The area will be loamed and seeded subsequent to the installation of the crypts.

Phase 3

Phase 3 of construction will take place in the northwest quadrant of the cemetery adjacent to Mother Brook. This phase includes the construction of the Lily Path Extension and a new cul-de-sac in the northwest corner of the cemetery. Lily Path Extension and Maple Avenue will have a 20 foot cross sectional width. The other roadways will have a width of 16 feet. The construction of the roadway includes a closed drainage system that will collect stormwater runoff and discharge to Mother Brook via an existing outlet pipe. This phase will also include the installation of water lines and spigots on the Lily Path Extension and Maple Avenue, including connection to the existing water main in East Street. These roadways will be resurfaced after the pipe installation. Trees will be planted on the northern side of the new roadway to provide a buffer between the roadway and Mother Brook. An existing roadway in this area will be removed, and loam and seed will be applied to the excavated areas.

Phase 4

Phase 4 includes the installation of approximately 870 double depth lawn crypts in the area west of the Lily Path Extension. The area will be loamed and seeded subsequent to the installation of the crypts.

Phase 5

Construction of Phase 5 includes the relocation of Poplar Avenue Rear and Cyndonia Path Rear. The roadways will be constructed to the north of the existing roadways and allow for the installation of approximately 1,800 double depth lawn crypts. The roadside will be graded and trees will be planted on the northern side of the roadways, providing a buffer between the roadway and Mother Brook. The existing intersections will be reconfigured, allowing for additional gravesite expansion. A 6-inch diameter water main and spigots will be installed, extending from the terminous of the Phase 3 pipeline. In addition, bituminous concrete berms and catch basins with sumps and hoods will be installed to collect stormwater runoff. Catch basins will discharge to the bank of Mother Brook, subject to Regulatory compliance. Roadways will be resurfaced after the pipe installation. In addition, the existing Cyndonia Path Rear will be removed and the area will be loamed and seeded to stabilize this area until the next phase of construction.

Phase 6

Installation of approximately 660 double depth lawn crypts. These additional crypts will be located south of the relocated Cyndonia Path Rear and will occupy the area of the existing Cyndonia Path. In addition to the crypt installation, a two-inch water line and spigots will be installed on Cyndonia Path. Following the installation, the roadway will be resurfaced and any grassed areas disturbed will be repaired.

Phase 7

Phase 7 includes installation of approximately 1,100 double depth lawn crypts in the area to southwest of Catalpa Avenue. A cul-de-sac path/walkway will be constructed in this phase to provide access to the gravesites in the expanded area.

Phase 8

The installation of water lines is the primary construction activity of Phase 8. The construction zone is within the central portion of the cemetery along Cedar and Evergreen Avenues. A 6-inch diameter water line will be installed from the terminus of the water line installed in Phase 5 to a connection to the Phase 3 water line at Lily Path. Branch connections on cross streets will be 4-inch diameter with 2-inch spigots. Roadways will be resurfaced after pipe installation.

Phase 9

Phase 9 includes continued installation of water lines. A 6-inch water diameter pipe will be installed on Brookdale Avenue, Lily Path, and Spruce Path. Connections will be made to waterlines installed in Phase 1, Phase 3 and Phase 8. Two-inch lines and spigots will be installed along Juniper Avenue and Elm Avenue. Roadways will be resurfaced after the pipe installation.

Phase 10

Phase 10 construction includes the new Office/Maintenance Building and parking area and the main entrance roadway into the cemetery, and installation of water lines and drainage pipes. The entrance roadway will be located directly across from Dominic Court and will extend northeast connecting into the existing Catalpa Path. It will have a 20-foot cross section with granite curb on each side. The water lines will connect to the Phase 8 and Phase 11 piping. A tapped connection will be made to the water main on Brookdale Avenue. Underground electric and telephone will also be installed. Drainage pipe will be connected to the existing outfall pipe. The construction will be carried-out in a manner to minimize impacts to the cemetery operations and access/egress to the cemetery. The work also includes relocating the cemetery monuments, to the main entrance. Plantings and landscaping will be added around the monuments.

Phase 11

With the new entrance road completed under Phase 10, Phase 11 will close the existing cemetery entrance at Brookdale Avenue and construct the roadway and infrastructure improvements near Tulip Avenue. This phase also includes demolition of the existing Office/Maintenance Building (after cemetery operations move to the new Office/Maintenance Building). The drain line connecting the fountain drain installed under Phase 1 and the drainage piping installed under Phase 10 will be installed.

Phase 12

Phase 12 of construction includes the installation of approximately 755 double depth lawn crypts in the area to the east of Catalpa Avenue. The area will be loamed and seeded subsequent to the installation of the crypts.

Phase 13

Continued installation of approximately 265 double depth lawn crypts in the area of the old cemetery entrance at Brookdale Avenue. The area will be loamed and seeded subsequent to the installation of the crypts.

Phase 14

This phase includes the construction of the perimeter walls, gate, and patio with one columbarium freestanding wall unit.

Phase 15

Phase 15 includes installation of approximately 595 double depth lawn crypts in the area north of Brookdale Avenue. These graves constitute the Veteran's section of the

Brookdale Cemetery and will be loamed and seeded subsequent to the installation of the crypts.

Phase 16

The final phase of construction includes the installation of two columbarium units.

4.2 CONSTRUCTION COSTS

Estimates of probable construction costs for the phased construction of the cemetery improvements are prersented in Table 4-1. The costs were developed to allow the Town to apportion funds over a long-term period, 10 to 20 years more or less. Some phases, particularly construction of double depth crypts and the water distribution system, can be broken down into additional phases if the Town so desires. The costs include contingencies and engineering, legal, and administration fees. At this stage of planning, Vollmer recommends a 25% contingency factor for budget purposes. The contingency factory typically declines as the design is refined. The estimated prices are based on the most current Engineering News Record (ENR) construction cost index of 6462. Prices can be adjusted to reflect future construction trends by multiplying the current cost by the ratio of the then current ENR index to the existing (2001) ENR index.

Table 4-1
Town of Dedham
Brookdale Cemetery Master Plan
Construction Phase Cost Estimates

	Unit	Unit Price	CONSTRUCTION PHASES																		
			Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	Phase 9	Phase 10	Phase 11	Phase 12	Phase 13	Phase 14	Phase 15	Phase 16	Subtotal	Admin, Legal, Eng. (25%)	Contingency (25%)	Total
Water System Improvements																					
6" DI Water main & fittings			50,000	-	90,000	-	200,000	-	-	200,000	200,000	80,000	60,000	-	-	-	-	-				
4" DI water main & fittings			50,000	-	-	-	-	-	-	80,000	-	-	-	-	-	-	-	-				
2" water service & spigots			20,000	-	20,000	-	-	20,000	-	90,000	50,000	-	10,000	-	-	-	-	-				
Valves			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Spigots			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Control Valves			-	-	10,000	-	-	-	-	-	-	10,000	-	-	-	-	-	-	1,240,000	310,000	310,000	1,860,000
Roadway Improvements			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Temp / Perm Paving (from graphic)			20,000	-	10,000	-	-	-	-	50,000	30,000	-	-	-	-	-	-	-				
Road (Sub-base, base, pvmt)			-	-	40,000	-	170,000	-	10,000	-	-	50,000	60,000	-	-	-	-	-				
Bituminous Concrete Berm			-	-	10,000	-	30,000	-	-	-	-	10,000	10,000	-	-	-	-	-	500,000	130,000	130,000	760,000
Drainage System Improvements			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Precast Structures			-	-	20,000	-	20,000	-	-	-	-	10,000	10,000	-	-	-	-	-				
8"- 12" Drain Line			-	-	60,000	-	80,000	-	-	-	-	10,000	20,000	-	-	-	-	-	230,000	60,000	60,000	350,000
Office/Maintenance Building			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Structure			-	-	-	-	-	-	-	-	-	260,000	-	-	-	-	-	-				
Site Work			-	-	-	-	-	-	-	-	-	40,000	-	-	-	-	-	-				
Demolition			-	-	-	-	-	-	-	-	-	-	10,000	-	-	-	-	-	310,000	80,000	80,000	470,000
Landscape Improvements			-	-	-	-	20,000	-	-	-	-	-	-	-	-	-	-	-	20,000	10,000	10,000	40,000
Double-Depth Lawn Crypts			-	100,000	-	520,000	-	400,000	660,000	-	-	-	-	450,000	160,000	-	360,000	-	2,650,000	670,000	670,000	3,990,000
Columbarium			-	-	-	-	-	-	-	-	-	-	-	-	-	140,000	-	170,000	310,000	80,000	80,000	470,000
Fountain Restoration			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Pond Liner			100,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Skimmer/Recirculation System			20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120,000	30,000	30,000	180,000
Monument Relocations			-	-	-	-	-	-	-	-	-	10,000	-	-	-	-	-	-	10,000	10,000	10,000	30,000
Utility Relocations			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Underground conduit			-	-	-	-	-	-	-	-	-	20,000	-	-	-	-	-	-	20,000	10,000	10,000	40,000
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Subtotal			260,000	100,000	260,000	520,000	520,000	420,000	670,000	420,000	280,000	500,000	180,000	450,000	160,000	140,000	360,000	170,000	5,410,000	1,390,000	1,390,000	8,190,000
Contingency- 25%			70,000	30,000	70,000	130,000	130,000	110,000	170,000	110,000	70,000	130,000	50,000	110,000	40,000	40,000	90,000	40,000	1,390,000			
Administration, Legal, and Engineering- 25%			70,000	30,000	70,000	130,000	130,000	110,000	170,000	110,000	70,000	130,000	50,000	110,000	40,000	40,000	90,000	40,000	1,390,000			
Total			**$ 400,000**	**$ 160,000**	**$ 400,000**	**$ 780,000**	**$ 780,000**	**$ 640,000**	**$ 1,010,000**	**$ 640,000**	**$ 420,000**	**$ 760,000**	**$ 280,000**	**$ 670,000**	**$ 240,000**	**$ 220,000**	**$ 540,000**	**$ 250,000**	**$ 8,190,000**			

5.0 CONCLUSIONS AND RECOMMENDATIONS SUMMARY

Brookdale Cemetery requires numerous improvements to facilitate cemetery operations, bring the cemetery into compliance with current envirinmental, health and safety requirements, and provide gravesites well into the next twenty (20) years. To that end, Vollmer recommends that the Town implement the following improvements.

- Restore the function of the Ebenezer T. Paul Fountain, line the pond to retain water, and install a water recirculation/skimmer system.
  Estimated Cost: **$180,000**

- Implement a program to resolve environmental compliance and health and safety issue as outlined in Table 2-5 herein.
  Estimated Cost: **$27,400**

- Realign the northern perimeter roadway and construct a cul-de-sec to provide space for development of additional gravesites. Resurface roadways.
  Estimated Cost: **$760,000**

- Install 4,400 double depth lawn crypts.
  Estimated Cost: **$3,990,000**

- Commission an Architectural Study to define the architectural style, footprint and functional layout of a new Office/Maintenance Building.
  Estimated Cost: **$10,000**

- Based on the findings of the Architectural Study, construct a new Office/Maintenance Building.
  Estimated Cost: **$470,000**

- Construct a looped water distribution with new spigots and isolation valves.
  Estimated Cost: **$1,860,000**

- Create a Columbarium with 960 Cremation Niches.
  Estimated Cost: **$470,000**

- Develop a set of guidelines for future landscape improvements in coordination with the Cemetery Advisory Committee.
  Estimated Cost: **$10,000**

- Make landscape improvements.
  Estimated Cost: **$40,000**

The total estimated cost of implementing the above recommendations is approximately $8.237 million. When implemented, the recommendations will resolve current environmental, health and safety issues, facilitate cemetery operations, bring the cemetery into compliance with Massachusetts General Laws, and provide gravesites well into the next twenty (20) years. Resolving environmental compliance and health and safety issue should be the first priority followed by a construction of improvements. Vollmer suggests that construction be implemented in phases, in the sequence presented on the following page.

Additionally, we suggest that construction of the recommended improvements be implemented in phases, in the sequence presented and discussed in Section 4.0.